The effects of differentiated instruction on Turkish students' L2 achievement, and student and teacher perceptions

Ahmet Cihat Yavuz a * iD

a NUN Schools, Beykoz, İstanbul, 34973, Turkey

Abstract

Endeavors have been invested to account for inefficient instruction, which is frequently attributed to disregarding learner idiosyncrasies. As a matter of course, differentiated instruction has begun to receive scholarly and professional attention in the hopes of ameliorating learner outcomes through learner-aware teaching. Despite a great deal of recorded research, little is known about how differentiated instruction is prepared and operationalized. This study, conducted at a private high school in Istanbul, Turkey, investigated the impact of differentiated instruction on Turkish L2 learners' L2 achievement along with the perceptions of learners and teacher. Two intact classes were selected as control (N=14) and DI group (N=8). The control group was exposed to traditional instruction, while the DI group received differentiated instruction guided by the principles of constructivism, multiple intelligence theory (Gardner, 1993), and the differentiated instruction framework of Tomlinson (1999). Data collected by means of L2 achievement tests revealed that DI group outperformed the control group in overall L2 achievement. Learner reflective essays revealed that Turkish L2 learners found differentiated instruction as distinctive, entertaining, engaging, instructive, and interest-related, while teacher reflective journals raised the issues of time constraints, needs for learner awareness and training about differentiated instruction.

1. Introduction

The significance of adapting instruction to individual differences has been recognized since the fourth century BC (Anderson, 1995). As a result of the increasing heterogeneity of students, educational research and policies focused their attention on these differences (Tomlinson, 2005). Despite teachers' acknowledgement of the need to cater to student diversities, they insist on using a one-size-fits-all approach in their

* Corresponding author. Tel: +90-554-771-4686
  E-mail addresses: ahmetcihatyavuz@gmail.com
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classrooms and overlooking students' individuality (Tomlinson & Kalbfleisch, 1998). The one-size-fits-all approach, as its name suggests, is based on the underpinning that all learners are treated in an egalitarian way by disregarding the wide range of diversity. However, it was not until recently that individual differences received surging interest, and failures in learner learning started to be attributed to the one-size-fits-all approach (Kasteloot, 2011). This consciousness has attracted mindful attention on differentiated instruction (hereinafter DI) among educators and researchers, and the demand for coping with learner diversities has become inexorable. DI, in contrast to the one-size-fits-all approach, considers diversities among learners, and assumes addressing these differences. Having said that, dealing with learner differences is highly ambitious, as it is potentially related to a vast array of aspects such as learner readiness, needs, interests, styles, capabilities, and level of development (Tomlinson et al., 2003). In the same vein, DI has multiple avenues to attend to these differences (Blaz, 2006), such as grouping learners according to their interest or level, setting individual learning outcomes, providing more instructional support through different sorts of materials, adapting course materials, giving more encouragement and time, and allowing for more in-depth exploration (Heacox, 2012; Tomlinson, 2005).

Although DI looks like a potential solution for grappling with learner differences, and thus maximizing achievement, most teachers maintain traditional instruction and abstain from espousing DI in their contexts, which is substantiated by research on teacher perception, specifically finding DI time-consuming (Njagi, 2014; Siam & Al-Natour, 2016; Stewart, 2016; Theisen, 2002) and necessitating particular knowledge base (Lunsford 2017; Oliver, 2016; Robinson, Maldonado, & Whaley, 2014). Hence, familiarity with the procedure of DI has not been established due to its equivocal perceptions, lack of scholarly effort, and eschewing any undertaking in educational contexts. While much has been reported about perceptual understanding and encountered barriers during implementation, little has been scrutinized for the sake of providing a pattern that is grounded in theory and structured through a variety of strategies. The current study will thus seek fulfilling this need through its well-constructed procedure.

In the following sections, the conceptual base of the study is firstly discussed with an emphasis on theoretical underpinnings that informed the structure of the DI, and then the implementation of DI is given by breaking it down into its characteristics and existing strategies.

1.1. Theoretical Framework

Tomlinson and McTighe (2006) defined DI as proactive planning informed by varied approaches to what learners should learn, how they will learn, and how they will demonstrate their learning in an attempt to reach out to each learner. It allows teachers to utilize varied instructional strategies to meet needs of each learner. In other words, teachers are flexible in tailoring the *content*, such as facts, concepts, and

principles (Blaz, 2006; Theisen, 2002; Tomlinson, 1999); the *process*, the way learners understand a key concept or develop the target skill (McCarthy, 2015; Tomlinson, 2001) and the *product*, the means by which learners show their understanding (Tomlinson, 1999). DI incorporates instructional strategies informed by learner varieties that provide significant information for teachers (Chung, 2005) and implemented considering various aspects of teaching.

The reconstruction of the aforementioned curricular elements requires full awareness of each learner in terms of their readiness -entry point to a specific concept or skill- (Tomlinson, 2014), interest through which teachers can relate lesson content to learners interests and boost motivation, and learning style which is determined by dominant intelligence (Dunn & Dunn, 1979; Gardner, 1993). Readiness of learners is traditionally determined through placement or achievement tests, whereas interest and learning styles, if attempted, are verified through surveys, observation and the other means. DI hinging on these three characteristics of learners discernibly opposes the one-size-fits-all mindset (Lewis, Rivera & Roby, 2012), for it is designed to cohere with students' readiness, interest, and learning style, and is enriched by instructional strategies such as tiered activities, choices, and flexible grouping. Yet, DI is not merely constituted by a set of strategies but grounded in and starts from a mindset assuming that each learner learns differently, and a single teaching style does not suit them when it is not conformed to their individual diversities. Thus, DI should be embraced by teachers in order to cope with individual differences and to optimize learning outcome rather than simply experiment a set of instructional strategies (Suprayogi & Valcke, 2016).

1.2. Previous studies

There has been a burgeoning interest in the research dedicated to DI for the past few decades. The learners who are exposed to DI strategies showed enhanced self-confidence (Affholder, 2003), increased motivation and engagement (Chien, 2012; Danzi, Reul & Smith, 2008; Powers, 2008; Ramos & Lasaten, 2018), and positive attitude (Baumgartner, Lipowski, & Rush, 2003; Karadağ & Yaşar, 2010; Liao, 2015), as measured by mixed data collection tools.

The impact of DI on learner achievement was also explored in the previous research. Baumgartner et al. (2003), found increased reading performance among primary and secondary school learners after being exposed to DI through flexible grouping, choices, longer self-selected reading time, and access to different reading sources. Similarly, Koeze (2007) reached increased reading achievement scores after implementing choice and interest strategies among fourth and fifth graders in Michigan; Beecher and Sweeny (2008) attempted to close the achievement gap among ethnically, culturally and economically diverse groups through enrichment program and DI. They found that engagement in learning was improved and the achievement gap reduced when elementary learners' interests and choices were taken into account.

However, studies conducted in the field of ELT are limited. Chien (2012) found more improved and effective learning after modifying pre-assigned resources, offering learners choices, assigning them various activities, and varying the assessment tools complied with L2 learners in a Taiwanese elementary school. Similarly, Alavinia and Farhady (2012) reached raised vocabulary achievement score among 80 Iranian English learners after addressing learners' multiple intelligences. Aliakbari and Haghighi (2014) also found a significant difference after fostering reading comprehension through tiered instruction in content, process, and product. Recently, Siddiqui and Alghamdi's (2017) study resulted in a significant difference following applying tiered activities and flexible grouping at the L2 remedial hours of a university's preparatory program in Saudi Arabia with the participation of 17 learners and 4 teachers. Paredes (2017) experimented DI strategies like double entry journal, reading charts, project menus in compliance with 43 university learners' interests and needs to gauge their impact on learners' EFL vocabulary, reading, and grammar achievement. The findings revealed that the experimented strategies made a difference on the stated areas of L2 students.

The previous research also investigated teacher perceptions of DI. Teachers consider DI as time-consuming (Siam & Al-Natour, 2016; Theisen, 2002), requiring professional training (Lunsford, 2017; Robinson et al., 2014; Siam & Al-Natour, 2016) and necessitating in-depth knowledge about learner characteristics (Oliver, 2016).

Considering the existing evidence, namely the necessity of catering to learner differences and the lack in the scrutiny of execution of DI specifically stimulated the present study to contribute to the field with a model by seeking the impact of DI on high school L2 learners.

2. Method

The current study is based on an experimental design, and integrated both quantitative and qualitative data collection instruments. It aimed to investigate the impact of DI on high school learners' L2 achievement as well as explore their and the teacher researcher's perceptions of DI. In conjunction with the stated goals, the following research questions were addressed.

1. Is there a difference between DI group and control group regarding their L2 achievement?
2. What are the L2 learners' perceptions about DI?
3. What are the teacher researcher's perceptions about DI?

2.1. Context and participants

The study was carried out at a private high school in Istanbul, Turkey. The school delivers education to 545 students aged 16-19. The overwhelming majority of the population is Turkish despite having limited number of foreign students from different countries. The school requires all the sections from 9th to 11th grade to take

an English placement test at the beginning of academic year, by which aiming to place students at the appropriate level ranging from A2 to C1 for the English Language Teaching program. Following the placement test, each grade is split into three CEFR levels according to the results such as ninth graders A2, B1 and B2.

The program intends to develop students' macro skills by offering them level-appropriate L2 program and thus graduate them with essential language communication skills. To this end, certain ELT coursebooks which are selected by a consultation committee before the onset of the academic year are assigned to the levels, and the ELT teachers are to cover the syllabi of these textbooks without diverging from the curricular goals of the program. Moreover, they are supposed to follow the procedural flow of the textbooks with a limited flexibility to adapt the book aligned with learner differences in terms of readiness, interest, learning styles and the other dynamic factors.

Concerning the assessment and evaluation of the program, the examination is administered over a common exam paper at the same time across the sister high schools. It thus forces educational staff of one campus to move along congruously with the other campuses. Having a standardized English program in each high school, as well as KG, primary and middle school, the institution gives little autonomy to its teachers to modify the program for learners' sake, which suggests that DI concerning content, process and product is nearly impossible unless it is specified in the unit plans. Yet, consent was given for two 9th grade classes only for research purposes and for a limited period.

The participants of the study were two intact 9th grade classes with a total number of 22 students aged 15-17 studying at the elementary level (A2, CEFR) in the English program. Selection was made based on convenience sampling after taking administrative and parental consents. The students were placed at this level after a placement test administered at the start of the school year. The evaluation was made only upon the number of correct answers without including other criteria such as overall school achievement and a nation-wide high school entrance test score. The control group consisted of fourteen students, whereas the experimental group consisted of eight students. Detailed information about participants is displayed on Table 1 which indicates the overview of pre-assessment results, namely Perceptual Learning Style Preference Questionnaire (hereinafter PLSPQ) developed by Reid (1984), Holland Codes or Holland Occupational Themes (Holland, 1997) and teacher observation. The instructor of the control group was a colleague of the researcher who had been teaching since 2015, while the instructor of the experimental group was the researcher who had been teaching since 2009. Each group had weekly 8 hours of English each lasting 40 minutes. During the research, the experimental group received 6 hours of treatment (in total 24 hours) per week.

Table 1. Participants

Student	Language Background	Learning Style (Reid, 1984)	Interest	Career Dispositions (Holland, 1997)	Classroom Behavior
1	Relatively better command due to his undertaking robust pre-8 English in China.	Major- Auditory Minor- Individual	Football, technology, comparing Chinese and Turkish cultures	Social jobs where he solves problems and works in cooperation	Likes working in groups and helping others
2	Fairly good command, likely due to the intensive English program in his early education	Major- Tactile and Auditory Minor- Individual	Cooking, photography	Social jobs where he interacts with people and solve their problems	Loves reading and watching about crime, patronizes the others
3	Confident yet ineffective English despite 4-year-long middle school program	Major- Group and Kinesthetic Minor- Individual	Cooking, videogames, watersports	Conventional jobs, working routinely as a accountant, clerk	Cooperative, helpful, enjoys competitive tasks
4	No prior experience likely due to poor state school program	Major- Auditory and Group Minor- Individual	Media and fashion	Media, enterprising fields	Conscientious, cooperative, yet lacks self-confidence
5	Poor command despite early education in France	Major- Auditory and Individual Minor- Group and visual	Videogames, computers	Engineer	Rarely grasps tasks or speaks, prefers working alone
6	Poor command of English despite intensive prior English program	Major- Individual Minor- None deduced from the scale	History and Theology	Social jobs such as teacher, psychologist, counselor	Alienated from the class, learns by writing, yet too slowly
7	Very poor command likely due to inefficient state-based program	Major- Group and visual Minor- Auditory	Cinema, music	Actor	Prefers pair-group works, bullying others
8	Very poor command likely due to irregular prior experience	Major-Kinesthetic an Group Minor-Individual	Computer	Enterprising occupations	Inclusive student, health problems occasional no-shows

The teacher researcher has been teaching English as a foreign language since 2009 to various groups of learners between the ages of 7 and 19 in Turkey. The researcher's interest area of research is primarily DI, curriculum development, and teacher education. Considering DI as the most essential solution for the current teaching context, he seeks expertise in the field of DI by experimenting various self-prepared lesson procedures in compliance with different DI strategies. The teacher researcher intended to contribute to this field with this study in which he used some pre-assessment surveys, implemented some DI strategies, and took some theoretical principles into account in the design of the DI lessons, which is given at length further in the paper.

2.2. Data collection instruments

The study incorporated multiple data collection phases to make sure that all the garnered data would be analyzed appropriately. PLSPQ and Holland Codes test were administered to assemble vital information about the participants before the treatment. With respect to the nature of the study, it relied heavily on the statistical analysis of the achievement test as a result of which the impact of the treatment on student L2 achievement was determined. Finally, with an intent to reach the effect of the experiment on the perception of the participants and the researcher, qualitative data was collected through reflective essays kept by the participants at the end of the study and reflective journals kept by the teacher researcher at the end of each treatment week.

2.2.1. Perceptual learning style preference questionnaire

The PLSPQ was developed by Joy Reid (1984) in an attempt to measure English language learners' preferred learning styles. It is made up of 30 self-reporting statements aiming to unveil six learning styles, namely auditory, group, individual, kinesthetic, tactile and visual based on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). As a consequence of the calculation tendered by the scale, engendered learning styles are classified as major, minor and negligible. Major learning style denotes the preferred learning style, whilst minor learning style could still function in learning as opposed to negligible learning style indicating difficulty learning in that way (Reid, 1995). The rationale behind the selection of this instrument was not only its suitability for the context (English Language Learning) but also its conduciveness to garnering information about learners' preferred way of learning, which informed DI-based lesson plans.

2.2.2. Holland codes

Holland Codes or the abbreviation RIASEC, developed by John L. Holland (1997), represents a theory of personality in concern with career dispositions. The test categorizes people in terms of their inclination to six distinct groups of occupations, namely realistic, investigative, artistic, social, enterprising, and conventions, which is conventionally abbreviated as RIASEC. The test comprises 48 occupational tasks that are rated by how much it is relished on a scale of 1 (dislike) and 5 (enjoy). The test is available online and takes 5-10 minutes to complete. The incentive behind implementing this test was its feasibility for unearthing respondents' career dispositions and descriptions of the task they are predisposed to enjoy experiencing, as well as its practicality for providing information about learners' profile.

2.2.3. Achievement test

The achievement test was applied three times as pre-test, post-test, and delayed post-test in the study. It comprised reading, writing, vocabulary and grammar questions which were taken from the material pack of the level textbook. The test was the recommended end of unit test that had been prepared in parallel with the unit goals and content. Therefore, piloting was not considered to be necessary to measure its suitability (validity) to the level. The test was conducted to both groups prior to the

treatment and lasted 60 minutes to complete. The same test was given to the participants as the post-test just after the treatment which lasted as long as four weeks, and as delayed post-test five weeks later. The reading section of the achievement test comprised ten questions. Five of these questions measured reading for main idea, whereas three of them measured reading for specific information, and two of them tested reading for detailed information sub-skills. The section constituted 25% of the total weight. Given writing section of the test, with 25% of total weight, it only had one task that required students to use target structures and words in a meaningful context. The pieces of students were assessed by two raters against the criteria given by the institution as suggested by Brown (2007). The quantitative data related to writing products of the control and experimental groups in pre-, post-, and delayed post-tests entailed a second rater for a reliable data analysis procedure. That being the case, the researcher requested a colleague of his, who holds a BA and MA degree in English Language Teaching, and has been teaching since 2009, to grade the writing pieces of both groups. Following the Cohen's Kappa calculation, a strong agreement between two raters in the pre-test (к =0.95), in the posttest (к =0.94), and in the delayed post-test (к =0.89) was found. Concerning vocabulary section, it was composed of 25 items each having one point of value, thus making up 25% of the total score. The type of vocabulary ranged from main verbs (15 items) to target nouns (10 items). Finally, the grammar section included 18 question items. Seven items gauged the ability of using possessive have in the correct form, while five items asked for distinguishing possessive "have" and present "to be". Last six items tested the ability of putting "can" in the correct form in a dialogue. The section constituted the final 25% of the overall score.

In the present study, the researcher controlled the measurement of instruments as a source of error. In addition to this, the procedure of scoring was objective and clear-cut, as the publishing company had already prepared the answer key of the test, which had single correct answer. For the writing pieces of the participants, an experienced ELT teacher graded the writings of the participants for more reliable interpretation. Moreover, the test was not brief but long enough to measure specific skills of the students efficiently, which also contributed to the reliability of the study. Furthermore, the achievement test was retaken five weeks after the post-test, which also increased the reliability of the study. When it comes to the Cronbach's alpha value of the study, it was .831 which confirmed the reliability and internal consistency of the test.

2.2.4. Reflective essays

Reflective essays illustrate one's perceptions, attitudes, understanding, thoughts and reactions upon some experience or on a subject matter. This study thus made use of reflective essays in order to reach the perceptions of the participants who experienced the treatment. The essays were written by all the students in the DI group. The students reflected on the treatment they had been exposed to for a month. The essays of the participants provided data for the second research question.

Following exploratory analysis of the essays to obtain a general sense of data (Creswell, 2012) in-depth coding process was conducted. During open coding, major categories (themes) related to the DI were identified. Specifically, major themes in concern with the participants' perceptions of DI were determined. As the study included open coding, the inter-rater reliability was sought for a true interpretation of the results. The inter-rater reliability means that "two or more individuals observe an individual's behavior and record scores, and then the scores of the observers are compared to determine whether they are similar" (Creswell, 2012, p. 622). To find out the inter-rater reliability, two expert ELT teachers determined major categories out of the codes. For this study, the formula proposed by Miles and Huberman (1994), assuming 80% agreement sufficient, was performed. Consequently, the inter-rater reliability was found 90%, which is above the satisfactory rate.

2.2.5. Reflective journals

A reflective journal is an account of a work in progress, which helps researcher reflect on the experience (Creswell, 2012). In this study, this data instrument was employed to explore the teacher's attitudes during the planning and preparation of differentiated lesson plans, and after the implementation, which provided data for the last research question.

2.3. Data Collection Procedure

The study lasted for nine weeks including four weeks of treatment. In the first week, the researcher collected data about DI group's interests, learning styles, and profile in order to acquaint himself with them and design informed lessons. To this end, two pre-assessment tests; PLSPQ developed by Reid (1984) and Holland Codes (Holland, 1997) were conducted to better familiarize himself with learners, particularly about learners' characteristics, learning styles and career dispositions, which later, along with the teacher researcher's observation notes, formed DI-based lessons,. After having a good knowledge of the learners, the researcher conducted achievement test in both groups to determine readiness in the second week.

Then, in the following four weeks, the teacher of the DI group abode by the content of the textbook as mandated by the school's ELT department but modified the process and product by harnessing the conceptual framework of constructivism. Specifically, he entailed from learners to engage in learning environment, to connect the input to their real-life and existing experience, and most importantly to build knowledge through interacting with peers and other people in an attempt to construct meaning of the given input. Additionally, he differentiated the process by taking the advice of Vygotsky (1978) in that it included activities that were just above the current level of students, (the zone of proximal development), thus challenging them to reach the lesson goals by constructing new knowledge stage by stage. In concern with his role, the teacher, as is also assumed in the constructivist theory, took on the role of facilitator who not only diagnosed the needs, abilities, interests, and learning styles of learners but also helped them construct meaning through appropriately designed

lesson plans as supported by DI strategies. Table 2 illustrates the theoretical and practical groundwork of the study, which is recommended for an informed DI.

Table 2. Theoretical and practical groundwork

Framework	Function
PLSPQ	To inform about learners' preferred learning styles
Holland Codes	To inform about learners' career dispositions
Observation	To inform about learners' classroom behaviors and their learning profile
Constructivism	To liaise knowledge with the real life
The ZPD	To build on current knowledge or skills through challenging activities
DI Framework	To guide instruction through its conceptual propositions and hands-on strategies
Multiple Intelligence	To inform instruction as regards task variation

The teacher researcher also differentiated the ways of production that the students would likely to prefer. In other words, lessons were designed, as underpinned by multiple intelligence theory, (Gardner, 2008, as cited in Paone, 2017) bearing diverse dominant intelligences among the class instead of expecting a shared type of from learners. Furthermore, he used DI strategies, as suggested by Tomlinson (1999) such as tiered-activities used to design materials in line with the readiness of the participants; choices used to provide learners with alternative tasks in relation to their interests and real life, and to give them the liberty of opting for any of them; flexible grouping used to group learners differently not only in compliance with their learning styles (e.g. individual learner, group learner) but also with their interests (e.g. the ones interested in photography), as reported in the PLSPQ and Holland Codes results. Table 3 exhibits a brief lesson procedure (practical implementation) of Week 3.

In the following two weeks both groups took the achievement test immediately and five weeks after the instruction; DI group wrote their reflective essays and the teacher researcher collected his weekly written reflective journals. In the last week (Week 9), the researcher analyzed both quantitative and qualitative data. The overview of the procedure is illustrated on Table 4.

Table 3. Example Procedure (Week 3)

Group	Aim	Procedure	Strategies
Control	Describe people using have in the affirmative form	Reading for detailed information	Traditional instruction that assumes almost full dependence on the textbook with very little flexibility to ensure standardization
		Listening for specific information in the context of clothing	
		Introducing lexical sets of colors and clothes	
		Speaking and writing activities based on textbook characters	
		Homework assignment from Workbook	
		Source: New Inspiration 1 Student Book (Garton-Sprenger & Prowse, 2011, pages 24 and 25)	
DI	Describe people using have in affirmative and the other forms	Conversational worksheet on what hobbies do they have, what do they have that most people do not have (St-1, auditory, above the average level, and St-2, auditory and above the average level). These two students with similar preferred learning style and level found their commonalities. The rest of the class followed the textbook sections	Flexible grouping
		Find someone who… in the context of expressing possession (The rest of the class)	Tiered activities
		St-1 & St-2 prepared a text related to the result of their exchange of information using conjunctions and, but.	
		Describe and identify famous people using have/has in pairs (Additional activity for the whole class)	
		Write a paragraph describing family members (St-4-5-6-7-8)	Choice
		Write a paragraph describing two celebrities comparatively (St-1-2-3)	
		Homework	
		Auditory (St-1-2-4-5) and group learners (St-3-7-8) prepare 10 questions using possessive have in the context of clothing, and interview one person from the family or friends.	Choice
		At the end of the interview the students were supposed to either prepare a chart about the wardrobe of the interviewed person or a video showing the person's clothing style	

Table 4. Overview of data collection procedure

Week	Procedure
Week 1	Observation, Perceptual Learning Style
	Preference Questionnaire, Holland Codes
Week 2	Pre-test
Week 3	Treatment, Reflective Journal
Week 4	Treatment, Reflective Journal
Week 5	Treatment, Reflective Journal
Week 6	Treatment, Reflective Journal
Week 7	Post-test
Week 8	Delayed post-test
Week 9	Reflective essays

2.4. Data Analysis

Non-parametric tests were run since the size was not big enough in control and experimental groups. Quantitative data were processed and analyzed through SPSS

(Statistical Package for the Social Sciences) version 22. Raw data out of student reflective essays and teacher reflective journals were analyzed inductively (Boyatzis, 1998), for there were no pre-determined categories to seek. With an explorative approach, the codes were identified using open coding, they were then categorized, which was followed by thematic analysis. The emerging codes and themes were iteratively verified in an attempt to make meaningful interpretations (Creswell, 2012).

3. Results

Aligned with the three research questions, this section is split into three subsections. The first subsection presents an overview of the achievement scores of both groups, while the other two sections give account of the inductive analysis of the reflection papers and reflective journals.

3.1. Achievement rates

Overall scores of each group were measured after each testing attempt using Friedman test (Table 5).

Table 5. Overall scores (Friedman test)

	Experimental						Control					
Item	M	SD	Min	Max	df	p	M	SD	Min	Max	df	p
Pre-test	35.7	18.15	13	60			36.9	15	10	63		
Post-test	67	17	41	90	2	0.002	49.4	15.3	25	80	2	0.000
Delayedpost-test	68.1	18.3	41	92			48.1	12.6	30	77		

The experimental group's scores are respectively (μ_1= 35.75, μ_2= 67.25, μ_3= 68.13) which indicated that the experimental group almost doubled the score after the treatment. It is concluded that the treatment made a difference on DI group's overall achievement. The delayed post-test test was implemented five weeks after the post-test, and the result showed no significant difference as compared to the post-test. The control group's overall scores are respectively (μ_1= 36.93, μ_2= 49.43, μ_3= 48.14) which showed around 13% increase from pre- to post-test. Once the delayed post-test scores were calculated, the result showed no difference comparing to the post-test. The effect size for this analysis (d = 1.06) was found to exceed Cohen's (1988) convention for a large effect size.

Wilcoxon Signed Rank Test (Table 6) was operated to identify the groups posing difference. As multiple comparisons were required to be made on the same data, the significance level was taken as =.05/3=.0167 (Bonferonni correction).

Table 6. Overall results (Wilcoxon Signed Rank)

Group		Post_overall – Pre_overall	Delayed_overall – Pre_overall	Delayed_overall – Post_overall
Experimental	Z	-2.533b	-2.524b	-.254b
	Asymp, Sig, (2-tailed)	0.0110	0.0120	0.7990
	Asymp, Sig, (1-tailed)	0.0055	0.0060	0.3995
Control	Z	-3.297b	-2.626b	-.770c
	Asymp, Sig, (2-tailed)	0.0010	0.0090	0.4410
	Asymp, Sig, (1-tailed)	0.0005	0.0045	0.2205

a. Wilcoxon Signed Ranks Test.

b. Based on negative ranks.

c. Based on positive ranks.

When Table 6 is viewed, there is a statistically significant difference between pre- and post-test overall scores (z=-2.533, p=.006<.0167) in the experimental group, which denotes that the treatment made a significant difference by leading to an increase in the overall scores. A significant difference is also true between pre- and delayed post-test (z=-2.524, p=.006<.0167). Regarding the difference between post- and delayed post-test, there is not a significant difference in terms of overall achievement (z=-.254, p=.399>.0167).

Given the control group, there is a statistically significant difference between post-test and pre-test overall scores (*z*=3.297, p=000<.0167). In other words, the traditional instruction made a significant difference by leading to an increase in the overall scores. A significant difference is also true between pre- and delayed post-test (z=-2.626, p=.004<.0167). Regarding the difference between post- and delayed post-test, there is not a significant difference in terms of overall achievement (z=-.770, p=.221>.0167).

The study's first research goal was to investigate the achievement difference between the DI group and the control group. Table 7 depicts both groups' overall achievements.

Table 7. Overall achievement (Mann-Whitney U)

Design	Item	Group	N	M	SD	MR	z	Sig.
Pre-Post Test	Overall	Exp.	8	31.50	11.68	18.13	-3.624	0.000
		Cont.	14	12.50	5.93	7.71		
Post-Del. Post Test	Overall	Exp.	8	0.88	6.77	13.25	-.959	0.338
		Cont.	14	-1.29	11.73	10.50		

Regarding overall achievement, the increase after treatment is 31.5 points in the experimental group, and 12.5 points in the control group, which poses a statistically significant difference (z=-3.624, p=0.000<.05) between the groups. Moreover, there is 0.88 points overall increase from post- to the delayed post-test in the experimental group, while there is -1.29 points decrease in the control group. When the difference is analyzed between these two groups (z=-.959, p=0.338>05), no significant difference is

found between the groups. To have a better insight into the achievement, Table 8 dissects the achievement score based on reading, writing, vocabulary and grammar sections.

Table 8. The breakdown of achievement

Design	Item	Group	N	M	SD	MR	z	Sig.
Pre-Post Test	Reading	Exp.	8	6.63	2.72	15.25	-2.085	0.037
		Cont.	14	3	4.69	9.36		
	Writing	Exp.	8	7.38	5.23	16	-2.467	0.014
		Cont.	14	2.36	2.70	8.93		
	Vocabulary	Exp.	8	9.50	3.16	18.19	-3.678	0
		Cont.	14	2.71	2.64	7.68		
	Grammar	Exp.	8	7.75	4.43	14.44	-1.611	0.107
		Cont.	14	4.14	4.81	9.82		
Post-Del. Test	Reading	Exp.	8	1.25	3.53	12.25	-.413	0.680
		Cont.	14	0.64	5.73	11.07		
	Writing	Exp.	8	1.38	4.27	10.88	-.345	0.730
		Cont.	14	1.79	4.93	11.86		
	Vocabulary	Exp.	8	-0.25	3.28	12.44	-.525	0.600
		Cont.	14	-1.93	5.75	10.96		
	Grammar	Exp.	8	0	3.02	12.88	-.757	0.449
		Cont.	14	-1.43	5.04	10.71		

Table 8 demonstrates that while the increase is up to 6.63 points in the experimental group, it is 3 points in the control group, which poses a significant difference (z=2.085, p=0.037 <.05) between the groups in terms of reading achievement. When the writing difference is analyzed between the groups (z=-2.467, p=0.014<.05), there is a statistically significant difference between the groups in terms of writing achievement. It also shows that there is a statistically significant difference (z=-3.678, p=0.000<.05) between the groups concerning vocabulary achievement. Given grammar achievement, unlike the previous measurements there is not a significant difference (z=-1.611, p=0.107>.05) between the groups.

3.2. Results of the Reflective Essays

An in-depth analysis of students' reflective essays yielded eight codes that were grouped into two main themes (Table 9).

Table 9. Thematic coding (Reflective essays)

Main themes	Codes
Positive Attitude	Entertaining, engaging, instructive
Unorthodox Aspects	Various activities (e.g. presentations, questionnaires) lack of full adherence to textbooks, right to choose, peer aid, interest-related tasks

Basically, participants expressed their content with the treatment with respect to its being entertaining, engaging and instructive, all of which were categorized as positive attitude.

> *[...] I had such entertaining lessons that sometimes I did not take a break because I was engaged in the tasks. In the previous lessons. I was not this engaged.* (S5)

> *[...] I easily learnt about grammar topics and words. I did not have any difficulties to understand them because we did several practices.* (S2)

Based on the comments, it can be inferred that differentiating L2 instruction resulted in not only fun and entertainment but also engagement and learning.

The participants also stated that the treatment brought unconventional aspects such as preparing presentations and questionnaires, not fully covering the textbook, giving students the liberty of choosing among optional activities, getting help from peers and having interest-related tasks.

> *[...] It was a different experience for me because we used to cover the textbook before this.* (S6)

> *[...] We were offered to choose among different tasks. I enjoyed preparing a recipe for "Patlıcan Kebabı", and Dos and Dont's of photography.* (S2)

> *[...] I did not use to work with a classmate very often, but in these lessons, I generally worked with them to prepare a questionnaire, to get their help about preparing a presentation and so forth. It was very useful.* (S5)

Based on the comments it is deduced that DI is viewed unconventional in many aspects such as the variety, flexibility and grouping of the activities, which was barely or never experienced in the traditional instruction.

3.3. Results of the Reflective Journals

An in-depth inductive look into the journals unveiled five codes that fell into two main themes (Table 10)

Table 10. Thematic coding (Reflective journals)

Main themes	Codes
Challenges	Time consuming, lack of autonomy
Familiarity	Student profile (e.g. learning styles, interests etc.), student differences, planning and implementing DI

The recurring patterns were mainly based on the challenges, specifically that DI be time consuming and the practitioner be unable to bend institutional regulations and rules.

> *[...] I cannot help thinking how I could deal with DI if it were required by the school, because it took all my weekend to prepare for one class.* (T, Treatment Week 2)

> *[...] If I did not have to adhere to the textbook, it would be easier to differentiate. Textbook constrained me to include target language and unit goals.* (T, Treatment Week 2)

> *[...] I had to cover certain parts of the book at times, as it was required by the foreign languages department to conduct the same exams across two campuses, which rather affected the efficiency of the study.* (T, Treatment Week 3)

These statements vividly indicate that planning and preparation for DI was time-consuming and nearly unmanageable because of the regular school responsibilities such as lesson plans, paperwork, and administrative burdens. Such being the case, it can be inferred that planning and preparing DI require a great deal of time, or else it is highly likely to be obstructed by time-constraints. The comments also emphasize that DI was impeded from a complete implementation due to institutional policies. This challenge of the researcher implies the issue of strict policies in the schools in which teachers neither have flexibility to modify syllabus nor are given autonomy to differentiate instruction for the optimization of learning. In other words, schools do not allow their teachers to change instruction for the sake of establishing standard instruction across multiple campuses.

The analysis of the reflective journals also revealed the fact that DI necessitates multilayered familiarity, particularly with learner diversities, learning styles, interests and teacher knowledge of planning and implementing DI.

> *[...] Although I applied the PLSPQ and Holland Codes to get to know their preferred learning styles, strong intelligences, and occupational orientations, I had to make observations to become more aware of my learners.* (T, Pre-assessment Week 1)

> *[...] I was overwhelmed while putting thought on how to cater to varieties and follow the curricular objectives at the same time. I need to improve myself in this area.* (T, Treatment Week 4)

The records of the teacher demonstrate that differentiating instruction called for a full awareness of learners in concern with not only their learning characteristics but also individual tendencies, interests, and so forth. Therefore, it can be concluded that DI starts with knowing learners' academic, and social varieties, as a result of which instruction can be effectively differentiated based on these varieties. The expressions of the teacher also highlight the fact that DI involved some degree of knowledge about the treatment to overcome the obstacles related to integrating DI tools into the present curriculum. This challenge of the teacher brings the issue of professional development to the light, as DI does not simply assume finding extra sources for the program; rather it conforms developed and adapted materials to learner varieties, which varies from context to context.

4. Discussion

The research sought to determine whether there was a difference in learners' overall L2 achievement including reading, writing, vocabulary, and grammar scores from pre- to post-test. The results demonstrated a significant difference between the scores of two tests both in control and DI groups, which suggests that both traditional instruction and DI gave rise to an increment in students' L2 overall achievement. However, concerning comparative results, it was found that the difference is higher in DI group than control group.

The reason to that is most probably due to DI's learner-centered approach that assumes and accepts students as individuals with diverse abilities, needs, interests, learning styles, and preferences. Conversely, traditional instruction bears whole-class delivery with little diversity but full commitment to the syllabus of the textbook. In other words, it is more teacher-centered in that it offers a standard teaching that is carried out nearly in the same way among practitioners. Simply put, traditional instruction did not surpass the impact of DI because it was applied irrespective of learner idiosyncrasies in the classroom.

Another reason that DI resulted in better scores might be due to the fact that the instruction embodies such DI strategies as tiered activities, choices, and flexible grouping. With tiered activities, the researcher assumed the mixed levels and abilities of the students by designing or redesigning materials in concert with learners' readiness and abilities over the same unit goals. For instance, some learners worked on preparing and conducting a new questionnaire on life skills, while the others conducted a ready-made questionnaire after making sense of the questionnaire items, which allowed all learners to reach the equal unit goals through level-appropriate tasks. This finding concurs with the study of Chien (2012) who reached similar outcomes through the previously mentioned strategies in an elementary school's EFL class in Taiwan, and with Siddiqui and Alghamdi (2017) whose study generated very similar results at the L2 remedial hours of a preparatory program in Saudi university.

Ultimately, incorporation of interest-relevant materials might be the other reason for the difference. Taking interests of learners into account led to a conducive learning environment in which the learners relished studying. This outcome is in line with the findings of Beecher and Sweeny (2008) who also found increased achievement scores after considering learners' interests in their longitudinal study conducted at an elementary school in the USA. Since limited research is available in L2 setting, there is still a need for further investigation into the impact of DI strategies.

The other research question aimed to look into the impact of DI on learners' perceptions, as interpreted from qualitative data obtained from reflective essays kept by the students in the DI group at the end of the study. Given the overall results, it can be stated that DI through the strategies of tiered activities, flexible grouping, and choices which were suited to learners' readiness and interests engendered a positive attitude. One reason to that is most probably that the learners' interests (e.g. St-2's

interest in cooking and photography, St-7's interest in cinema) were considered during the preparation of DI, which corresponds with the result of Danzi et al. (2008) who also found increased motivation and decreased boredom in their study with primary and middle school learners. The other reason to such a result might be due to the unconventional instruction in which learner's mixed readiness levels were respected, and coped with through tiered activities, which is in agreement with Karadağ and Yaşar (2010), whose study revealed that such DI strategies affected students' attitude in a positive way among middle school Turkish learners. By the same token, Chien (2012) measured the impact of tiered tasks, and found boosted learner motivation, and joy among a Taiwanese elementary school's EFL learners. Moreover, the findings are in line with Liao (2015) who uncovered that such tasks had positive influence on learner perception at a Taiwanese university's EFL classes. The final reason is probably the consideration of varied learning styles in DI groups as informed by the results of PLSPQ test, which was also found effective in Ramos and Lasaten (2018). However, it should be noted that it is almost impossible to address each learner's individual interests, abilities, and learning styles especially in larger groups. Therefore, the size of the class was the reason that encouraged the teacher to offer diverse interest-relevant tasks. Yet, it is likely to diversify existing materials in the way that are tailored to mixed learning profiles in general if not peculiar to individuals.

The objective of the final research question was to elucidate the perceptions of the teacher researcher about the implementation of DI, as extracted and interpreted from the recurring themes in the reflective journals weekly kept by the teacher. The overall results of data analysis suggested that implementation of DI posed many a challenge such as keeping up with school schedule and DI at the same time, being conscious about the learners, knowing how to differentiate, and meeting institutional curricular requirements. The first and foremost difficulty for the teacher was to maintain DI and the regular workload at the same time. In other words, the most significant issue is time constraints. The necessity for more time is generally induced by the amount of regular workload of teachers including lesson plans, documentations, paperwork, and meetings. This issue is also agreed by Theisen (2002) in which teachers expressed their concern, and difficulty about the lack of time; Robinson et al. (2014) who also found lack of adequate time among many other challenges of teachers, as well as Oliver (2016), and Siam and Al-Natour (2016), all of whom reached the same conclusion. The other recurring theme found in the reflective journals was the indispensability of being informed about learner profile, by which the researcher drew attention to the becoming aware of learners' needs, abilities, profiles, interests, strengths, weaknesses and the other characteristics. This finding also aligns with Oliver (2016) in which the participants reported their trouble knowing and meeting the needs and abilities of learners. The other major theme was the necessity of familiarity with planning and carrying out DI, which recommends that professional development and training are required to be able to differentiate instruction effectively, which concurs with the findings of Oliver (2016), and Lunsford (2017).

This finding uncovers the fact that differentiation of instruction is not an easy job such as taking attendance and managing classroom that can be achievable by every incumbent teacher. On the contrary, it entails in-depth knowledge about the principles of DI, in which institutions need to prioritize as a need of teachers to cater to immediately if DI is of high importance to the school. In brief, apart from the expected difficulties of DI like time constraints, professional development, the perspectives of institutions in standardization, giving flexibility to teachers constitute a significant issue in front of teachers, and make DI even harder.

5. Conclusions

The present research study intended to find out whether DI resulted in a significant difference in L2 achievement of Turkish high school students, and explore the students' perceptions about DI and the teacher's perception about planning and implementing DI. Quantitative findings displayed that DI makes a difference in L2 achievement among Turkish high school learners as measured by an achievement test. Qualitative data analysis displayed that investigating student perceptions generate valuable data for teachers who plan to execute DI in their classroom. Similarly, findings from teacher journals generated important ideas and issues in the field of DI.

The study has several recommendations for future research in the field of DI. The recommendations are presented firstly through the lens of English language teaching practitioner and then researcher. First and foremost, it should be noted that DI is not a teaching method nor a range of strategies but an approach to teaching and a way of thinking. To elaborate, DI does not have strict boundaries that limit teachers to carry out specific strategies in specific ways. Conversely, it offers a mindset that expects to become aware of learner varieties in needs, abilities, interests, learning styles, and intelligence in class, thus entailing to prepare lessons in response to the existing varieties. Briefly, it is a teaching approach that considers student differences, and assumes learner-focused and tailored instruction in accordance with varied learner characteristics.

Secondly, it is recommended for teachers, who intend to enact DI, especially in large classes, to administer pre-assessment tools and make preliminary observation about how their learners learn, and what their interests, strengths and weaknesses are. It is paramount to get to know more about learners, which yield valuable data that inform the implementation of DI. After getting the results from pre-assessment tools, teachers could group learners in terms of their readiness, preferred learning styles, and interests. In so doing, teachers could design lessons in alignment with general characteristics of learners, rather than trying to cater to every single variety in the class, which is not a part of DI. In brief, one should note that DI is not individualized instruction.

Thirdly, DI encompasses a broad spectrum of strategies, areas, and theoretical assumptions, which might deter language teachers from trying it in their classes.

However, teachers should not be daunted by the scope of DI but commence DI with small steps. In other words, they might initiate it by differentiating presentation (not executed in this study), practice or production in the beginning. Apart from the steps of teaching, teachers might consider differentiating specific skills such as reading lessons, CLIL lessons in the first place so that they could see difficulties and possibilities, and thereby conveying it to teaching in general.

Fourthly, as DI requires plenty of time for preparation, it might be advisable to carry out DI with smaller groups for the sake of piloting, then generalizing it to more classes, and after that perhaps to the whole school.

The last recommendation for teachers is that it is imperative to invest in professional development in this field by reading about diverse DI strategies, observing colleagues, or watching videos reflecting DI. Otherwise, one might confuse DI with providing individual instruction, giving extra work to strong learners, or focusing attention on learners with learning difficulties.

Regarding recommendations for researchers, firstly, more research is needed in this field with a larger group of learners, which makes it more likely to generalize the results of the study. Secondly, similar research should be conducted in which teachers of the experimental group and control group are the same to increase reliability of the study. Thirdly, as this study was conducted with a four-week treatment period, further research could be conducted at a longer period, which will yield more sustainable and generalizable data. Lastly, to increase external validity of the study future research could apply DI with different levels and groups of learners such as upper intermediate young adults, advanced adults, or young learners.

The Conflict of Interest Statement

In line with the statement of Committee on Publication Ethics (COPE), I hereby declare that we had no conflicting interests regarding any parties of this study.

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